

Att'y Ref. No. 003-123

U.S. App. No.: 10/808,493**REMARKS**

Favorable reconsideration, reexamination, and allowance of the present patent application are respectfully requested in view of the foregoing amendments and the following remarks.

**Rejection under 35 U.S.C. § 103(a)**

In the Office Action, beginning at page 2, Claims 1-5 were rejected under 35 U.S.C. § 103(a), as reciting subject matters that allegedly are obvious, and therefore allegedly unpatentable, over the disclosure of U.S. Patent No. 5,741,119, issued to Heppenstall, in view of the disclosure of U.S. Patent No. 4,743,166, issued to Elston *et al.* ("Elston"). Additionally, Claim 6 was rejected under section 103(a) as allegedly being obvious over Applicant respectfully requests reconsideration of these rejections.

Different from the prior art applied in the Office Action, this application describes a turbomachine with blades and intermediate pieces mounted alternatively in a circumferential groove of the rotor wherein the intermediate pieces, differentiated from the blades, are formed a material with a lower density (e.g., intermetallic compound, titan aluminide alloy, titanium alloy) than the material of the rotor (e.g., stainless steel). Thus, one aspect of the present invention includes developing a thermal turbomachine in which the service life of the rotor is extended on account of a reduced weight. Additionally, the usage of these intermetallic pieces is advantageous for the compatibility of the thermal expansion coefficients of the blades, the rotor, and these peaces.

Claim 1 relates to an axial flow turbomachine having a combination of elements including, *inter alia*, a rotor made from a metallic material with a first density ( $D_1$ ), rotor blades and intermediate pieces alternately mounted in a circumferential groove, wherein the intermediate pieces comprise a material with a second density ( $D_2$ ) lower than the first density ( $D_1$ ).

The prior art, including

*Heppenstall* discloses a special design of the blade root and does not mention anything about structures termed herein as 'intermediate pieces.' Instead, *Heppenstall* discloses that the

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teeth flank surfaces of the teeth on the root section of the rotor blade are arranged at a different angle to the teeth flank surfaces of the teeth on the slot of the rotor (see, e.g., Abstract). This allows rotor blades and rotors with different teeth stiffness (this may be a result of the use of different material, see column 1, lines 40-41) to be used together, while retaining a predetermined load distribution over the nominal contact region (see column 4, lines 23-26). The engagement between the blades and the supporting rotor is a crucial part of the design of any rotor; therefore *Heppenstall* wants to improve that engagement (see column 1, lines 10-15). *Heppenstall* discloses that the root attachment for the blade may comprise a titanium aluminide alloy, a titanium alloy, or a gamma titanium aluminide, while the rotor may comprise a nickel base alloy or a steel (see column 2, lines 18-24, column 4, lines 26-29, and claims 8-11, and 14).

*Elston* discloses a blade root seal for preventing leakage in a turbomachine. The blade includes an airfoil and a root separated by a platform so that the root is mountable within the slot and the platform extends beyond the root to first and second opposite ends. The seal generally contacts the slot of the disc and the platform, and extends circumferentially from the root to the first end (see Abstract). The seal is, according to *Elston*, preferred to be elastomeric, but other material with good sealing properties may be also employed (*Elston*, column 2, lines 64-68, column 3, line 22, and claim 7). There is no mention, suggestion, recognition, or even a hint in *Elston's* patent of the importance or advantage of using intermediate pieces made of a metallic material with lower density than the density of the rotor material, and with high stiffness and with damping effects at higher temperatures as exhibited by some of the exemplary material of the present invention, such as gamma TiAl or orthorhombic intermetallics. *Elston's* invention has a completely different object from one of those of the present invention, and therefore understandably is silent about the material choice of 'intermediate pieces'.

The statement in the Office Action that the purpose of *Elston's* patent is "reducing weight and easing mounting problems" (column 1, lines 21 -26) twists *Elston's* disclosure, as this passage relates to dovetail roots (see column 1, lines 22-24) and to nothing else. The fact that *Elston* may mention particular materials does not instruct the skilled artisan to use those materials in an *ad hoc*, hindsight reconstruction of Applicant's claimed invention from this

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specification. The Office Action states, from the bottom of page 2 into the top of page 3, that “intermetallic alloys and lightweight alloys listed as root attachment materials in the *Heppenstall* reference could be used as the intermediate seal pieces 24 to reduce weight” (emphasis added); this statement underscores the fact that the Office Action replaces the requirements of motivation and suggestion to combine in a *prima facie* case of obviousness with speculation, wishfulness, and conjecture. What ‘could’ be done with *Heppenstall*’s materials is not the question; to what the prior art guides one of ordinary skill, upon a full and fair reading of the prior art documents, is a more critical inquiry. The Office Action thus fails to make out a *prima facie* case.

*Siga* fails to cure these fundamental deficiencies, because *Siga* also fails to disclose, describe, or fairly suggest the differences between the *Heppenstall* and *Elston* and the claimed combinations.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1-6, each taken as a whole, would not have been obvious to one of ordinary skill in the art at the time of Applicant’s invention, are therefore not unpatentable under 35 U.S.C. § 103(a), and therefore respectfully requests withdrawal of the rejection thereof under 35 U.S.C. § 103(a).

### Conclusion

Applicant respectfully submits that the present patent application is in condition for allowance. An early indication of the allowability of this patent application is therefore respectfully solicited.

If the patent examiner believes that a telephone conference with the undersigned would expedite passage of this patent application to issue, they are invited to call on the number below.

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It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. If, however, additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and the Commissioner is hereby authorized to charge fees necessitated by this paper, and to credit all refunds and overpayments, to our Deposit Account 50-2821.

Respectfully submitted,

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